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Checklist of Pacific Northwest Tabanidae with New State Records and a Pictorial Key to Common Species (Diptera, Tabanidae)[1]

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Abstract.—An annotated checklist of the horse flies and deer flies of Washington, Oregon, Idaho, western Montana and southern British Columbia is presented. New state records for Washington (10 spp.) and Idaho (2 spp.) are also given. Pictorial keys are provided to assist in identifying females of 47 species in 7 genera most commonly found in the Pacific Northwest region.

Philip (1965) catalogued 65 species of horse and deer flies in 9 genera from Washington, Oregon, Idaho, and portions of Montana and British Columbia. In the nearly 20 years since Philip's compilation there have been slight adjustments in the numbers of species, including additions and deletions, some synonymy and several important range extensions. There remains a dearth of overall taxonomic works for tabanids specifically of this region. Adult horse and deer flies occurring in the Pacific Northwest (PNW) have been treated as portions of more extensive revisionary studies (Brennan, 1935; Philip, 1954, 1955; Stone, 1938), in treatments of taxonomically difficult groups (McAlpine, 1961; Teskey, 1982), or simply in descriptions of new species. Descriptions of immatures and their biologies for many PNW species can be found in Burger (1977), Lane (1975, 1979), Middlekauff and Lane (1980), and Teskey (1969). These references serve to identify the more important and recent publications that include PNW tabanids.

The present PNW checklist, preliminary to a more complete study, is the result of extensive survey/biological studies by me in Washington and recent surveys in Idaho (Nowierski and Gittins, 1976) and Oregon (Mahmoud, 1980). Additional work in Alberta (Thomas, 1973), California (Middlekauff and Lane, 1980) and Illinois (Pechuman et al., 1983) has helped to complete the picture of distribution patterns in areas adjacent to the region. As a result, a more accurate idea of the nature and composition of the regional tabanid fauna and its relationships to adjacent areas is emerging.

The following individuals allowed access to their collections and specimens in their care or shared important distribution information: P. H. Arnaud, Jr. and C. B. Philip (Calif. Acad. Sci., San Francisco); J. D. Lattin and A. A. Mahmoud (Ore. St. Univ., Corvallis); L. L. Pechuman (Cornell Univ., Ithaca); J. A. Powell and E. I. Schlinger (Univ. Calif., Berkeley); and F. C. Thompson (USDA, ARS,

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SEA, Washington, D.C.). Their assistance is appreciated. Dr. Pechuman kindly provided information on tabanid distribution for each western state and the Canadian Provinces. He along with Dr. H. J. Teskey (Canad. Nat. Coll., Ottawa) also made important comments about the particular species discussed here. Appreciation is extended to E. P. Catts for his review of the manuscript and for testing the keys.

CHECKLIST OF SPECIES

Recent specific name changes and descriptions of new species have produced several new names for western species recognized as occurring here. Some of the more important changes include the following (all new names or changes since Philip, 1965, are denoted on Table 1 with an asterisk): *Chrysops ater* Macquart now refers to western forms recognized previouly as *C. carbonarius* (Walker), a species evidently restricted to eastern North America (Pechuman and Burton, 1969; Pechuman, 1981a; and Pechuman, in Middlekauff and Lane, 1980); *Hybomitra lurida* (Fallén) supercedes *H. metabola* McDunnough (Pechuman and Stone, 1968); Pechuman (1981b) synonymized *Atylotus incisuralis* Macquart with *A. insuetus* Osten Sacken; *Tabanus similis* Macquart replaces western forms previously called *T. lineola* Fabricius and *T. lineola scutellaris* Walker as does *T. tetropsis* Bigot for *T. productus* (Middlekauff and Lane, 1980); *Hybomitra philipi* Stone was synonymized as a populational variant of *H. sonomensis* Osten Sacken and *H. enigmatica* Teskey was recognized as new and separate from related *H. sonomensis* and *H. phaenops* Osten Sacken (Teskey, 1982); *H. typha* (Whitney) was found to be restricted to eastern North America and the western forms were described as *H. pechumani* Teskey and Thompson (1979).

Subspecies and variants for three species have been recognized as valid species or evidence suggests that they should be treated as such. *Hybomitra phaenops* Osten Sacken, long recognized as a subspecies or variant of *H. sonomensis,* was elevated to specific rank on differences in immature stages and their habits (Middlekauff and Lane, 1980; Teskey, 1982). Similarly, *Apatolestes willistoni* Brennan, treated as a variant of *A. comastes* Williston, is now recognized by Middlekauff and Lane (1980) as a separate species. The latter workers and Mahmoud (1980) indicate that *A. willistoni* var. *fulvipes* Philip is the form occurring in the region (see comment below). Based on morphology and distributional data, *H. osburni* Hine is likely separate from *H. rhombica* Osten Sacken, a species which is restricted to Utah and adjacent states (Pechuman, pers. comm.).

In contrast, a number of subspecies and variants are considered here simply as populational variants. They occur occasionally as individual morphs, melanic forms, or clinal variants that apparently integrate broadly in color or pollinosity characters with typical forms in contiguous populations. They have no status and I see no need to recognize each variant. They are included here so that proper associations with their respective species can be made. Variants occurring in the PNW and references to their current status are as follows: *Apatolestes willistoni* var. *fulvipes* Philip (Middlekauff and Lane, 1980); *Pilimas californica* var. *beameri* Philip (Middlekauff and Lane, 1980); *Chrysops aestuans* var. *abaestuans* Philip (Nowierski and Gittins, 1976); *C. aestuans* var. *confusus* Krober (listed in the Nearctic Diptera catalog as a variant of *C. callidus* Osten Sacken, but Pechuman (pers. comm.) suggests that *C. callidus* probably does not occur in the west; also

Table 1. List of Tabanidae of the Pacific Northwest.

	ORE	WASH	BC	IDA	MONT
Apatolestes					
albipilosus Brennan	+				
comastes Williston	+	+	+	+	+
**willistoni* Brennan[a]	+	+	+	+	+
comastes var. *willistoni* Brennan					
var. *fulvipes* Philip					
Pilimas					
californica (Bigot)	+	+	+	+	+
var. *beameri* Philip					
Stonemyia					
tranquilla fera (Williston)	+	+	+	+	+
Silvius					
gigantulus (Loew)	+	+	+	+	+
notatus (Bigot)	+	+		+	
philipi Pechuman	+				
quadrivittatus (Say)					+
Chrysops					
**aestuans* van der Wulp	+	+	+	+	+
var. *abaestuans* Philip					
var. *pseudoconfusus* Philip					
callidus var. *confusus* Krober					
asbestos Philip	+	+	+	+	+
**ater* Macquart				+	+
carbonarius Walker					
fugax Osten Sacken					
carbonarius var. *nubiapex* Philip					
bishoppi Brennan[b]	+	+			
var. *gilvus* Philip					
coloradensis Bigot	+	+	+		
discalis Williston	+	+	+	+	+
excitans Walker	+	+	+	+	+
frigidus Osten Sacken	?	?	+	+	+
var. *xanthas* Philip					
fulvaster Osten Sacken				+	+
furcatus Walker	+	+	+	+	+
var. *chagnoni* Philip					
mitis Osten Sacken	+	+	+	+	+
nigripes Zetterstedt				?	
**noctifer* Osten Sacken	+	+	+	+	+
noctifer pertinax Williston					
proclivis Osten Sacken	+	+	+		
var. *atricornis* Bigot					
surdus Osten Sacken	+	+	+		
var. *piceus* Philip					
wileyae Philip	+				
Haematopota					
americana Osten Sacken	?	+	+	+	+
Atylotus					
**calcar* Teskey	+	+	+	+	+

Table 1. Continued.

	ORE	WASH	BC	IDA	MONT
**insuetus* (Osten Sacken)	+	+	+	+	+
incisuralis (Macquart)					
tingaureus (Philip)	+	+	+	?	+
**utahensis* (Rowe and Knowlton)	+			+	
Hybomitra					
aasa Philip	+	+	+		
affinis (Kirby)[b]		+	+	+	+
astuta (Osten Sacken)	+				
atrobasis (McDunnough)	+	+	+	+	+
californica (Marten)	+	+	+	+	+
captonis (Marten)	+	+	+	+	+
**enigmatica* Teskey	+	+	+	+	+
epistates (Osten Sacken)	+	+	+	+	+
frontalis (Walker)		+	+	+	+
fulvilateralis (Macquart)	+	+	+	+	+
hearlei (Philip)			+		
illota (Osten Sacken)		+	+	+	+
lanifera (McDunnough)	+	+	+	+	?
lasiopthalma (Macquart)[b]		+	+	+	+
liorhina (Philip)			+		
**lurida* (Fallén)		?	+	+	?
metabola McDunnough					
melanorhina (Bigot)	+	+	+	+	+
nuda (McDunnough)[b]		+	+	+	+
opaca (Coquillett)	+	?	+	+	+
**osburni* (Hine)	+	+	+	+	+
rhombica var. *osburni* Hine					
**pechumani* Teskey and Thompson[b]		+	+	+	+
typha Whitney, in part					
pediontis (McAlpine)				+	+
**phaenops* (Osten Sacken)	+			+	+
sonomensis var. *phaenops* Osten Sacken					
procyon (Osten Sacken)	+	+	+	+	+
rupestris (McDunnough)	+	+	+	+	+
sequax (Williston)	+	+	+	+	+
**sonomensis* (Osten Sacken)	+	+	+		
**philipi* Stone					
tetrica (Marten)	+	+	+	+	+
var. *hirtula* Bigot					
var. *rubrilata* Philip					
trepida (McDunnough)[b]		+	+	+	?
zonalis (Kirby)[a]		?	+	+	+
zygota (Philip)[b]	+	+	+		
Tabanus					
aegrotus Osten Sacken	+	+	+	+	+
fratellus Williston	+	+	+	+	+
kesseli Philip	+	+	+	+	+
laticeps Hine	+	+	+		
marginalis Fabricius[b]		+	+	+	?
monoensis Hine[b]	+	+		+	
punctifer Osten Sacken	+	+	+	+	?
reinwardtii Wiedemann					+

Table 1. Continued.

	ORE	WASH	BC	IDA	MONT
**similis* Macquart	+	+	+	+	+
lineola Fabricius					
lineola scutellaris Walker					
stonei Philip	+	+	+	+	+
var. *jellisoni* Philip					
**tetropsis* Bigot[b]	+	+	?	+	+
productus Hine					

[a] New Idaho state record.
[b] New Washington state record.

see Nowierski and Gittins, 1976); *C. bishoppi* var. *gilvus* Philip (Middlekauff and Lane, 1980); *C. frigidus* var. *xanthus* Philip (Nowierski and Gittins, 1976); *C. furcatus* var. *chagnoni* Philip (Thomas, 1973); *C. proclivis* var. *imfurcatus* Philip and var. *atricornis* Bigot (Middlekauff and Lane, 1980); *C. surdus* var. *piceus* Philip (Middlekauff and Lane, 1980); *Hybomitra tetrica* var. *hirtula* (Bigot) (Middlekauff and Lane, 1980). The subspecies *Chrysops noctifer pertinax* Williston is treated likewise (Middlekauff and Lane, 1980).

Total diversity of genera and species seems to vary little among the PNW states and western Canadian province of British Columbia. All areas share the same nine genera (if one assumes that *Haematopota* occurs in Oregon, although it is not yet recorded from there). The overall diversity of species is likewise very similar with the greatest number occurring in southern British Columbia (56) and the least in western Montana (49). Tallies of species for other PNW states are Washington (54), Idaho (54) and Oregon (52). British Columbia shares similar coastal habitats and associated fauna with Washington and Oregon, but it also receives more boreal and montane faunal influences from the north and northeast. These northern relationships increase the diversity for British Columbia as several species do not extend farther south into the states. The low number of species in Oregon is surprising as one would expect its southern portion to be influenced by California to the south. I suspect that Oregon, Montana and Idaho may show greater diversity in the final analysis, but their fauna has been insufficiently collected.

The limited distribution of some species may reflect a lack of collecting or actually represent species that are geographically limited. Four *Chrysops* species (*C. ater, C. frigidus* Osten Sacken, *C. fulvaster* Osten Sacken, and *C. nigripes* (Zetterstedt)) are known from the eastern portions of Montana and Idaho, but they have not been collected or have questionable records in Washington and Oregon. *Tabanus reinwartii* Wiedemann likewise is a midwestern species that has invaded the eastern foothills of the Rocky Mountains in Montana but no farther west. While many species have wide distributions throughout the PNW region, others with similar patterns have not been recorded in certain areas. For example, it is difficult to explain the following absences: *Atylotus tingaureus* (Philip) from Idaho; *Tabanus marginalis* Fabricius, *T. punctifer* Osten Sacken, *Hybomitra lanifera* (McDunnough) and *H. lurida* from Montana; *H. pechumani, H. lurida, H. opaca* (Coquillett), and *H. zonalis* (Kirby) from Washington; *Tabanus tetropsis*

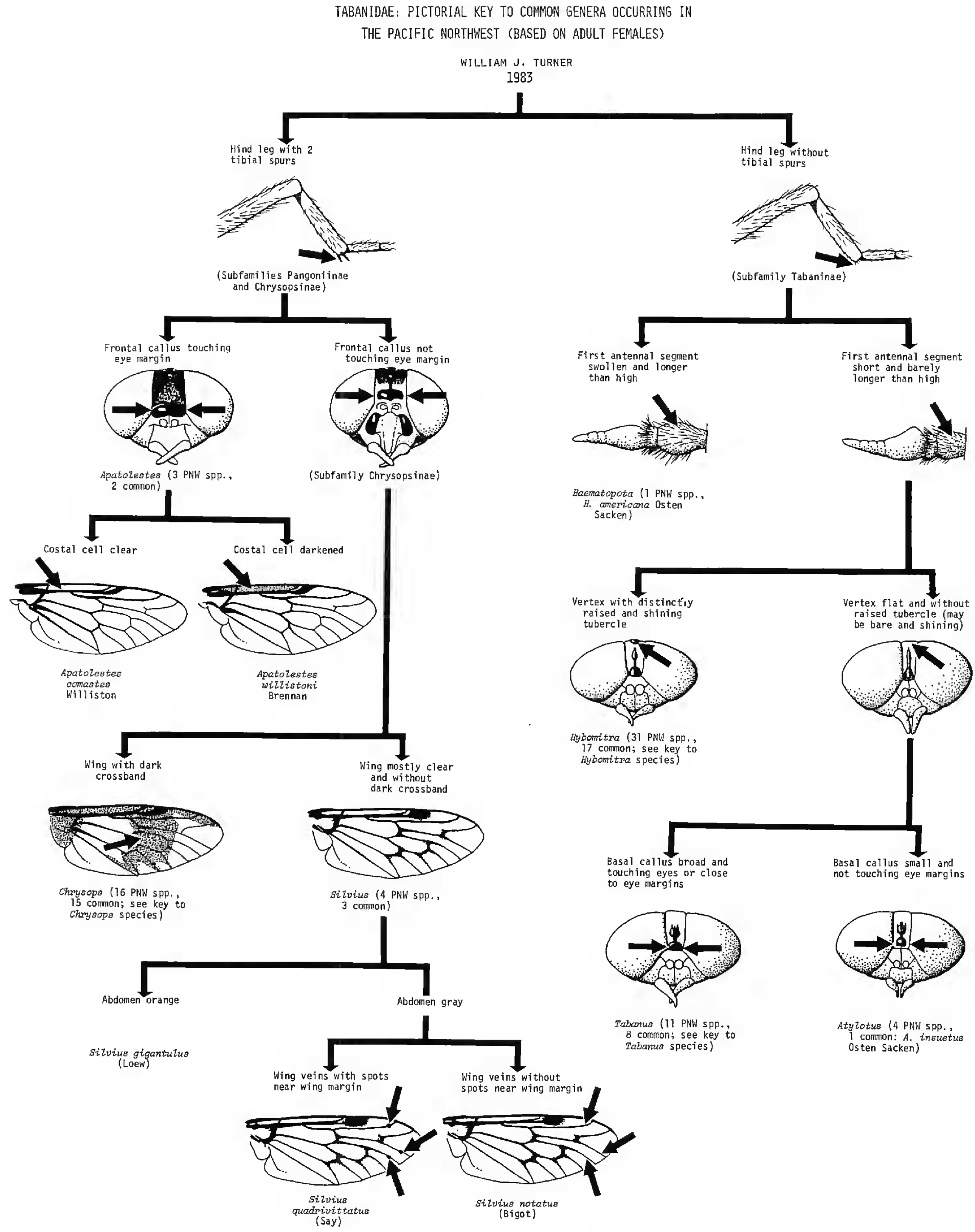
TABANIDAE: PICTORIAL KEY TO COMMON GENERA OCCURRING IN
THE PACIFIC NORTHWEST (BASED ON ADULT FEMALES)
WILLIAM J. TURNER
1983
Hind leg with 2 tibial spurs
Hind leg without tibial spurs
(Subfamilies Pangoniinae and Chrysopsinae)
(Subfamily Tabaninae)
Frontal callus touching eye margin
Frontal callus not touching eye margin
First antennal segment swollen and longer than high
First antennal segment short and barely longer than high
Apatolestes (3 PNW spp., 2 common)
(Subfamily Chrysopsinae)
Haematopota (1 PNW spp., H. americana Osten Sacken)
Costal cell clear
Costal cell darkened
Vertex with distinctly raised and shining tubercle
Vertex flat and without raised tubercle (may be bare and shining)
Apatolestes comastes Williston
Apatolestes willistoni Brennan
Hybomitra (31 PNW spp., 17 common; see key to Hybomitra species)
Wing with dark crossband
Wing mostly clear and without dark crossband
Chrysops (16 PNW spp., 15 common; see key to Chrysops species)
Silvius (4 PNW spp., 3 common)
Basal callus broad and touching eyes or close to eye margins
Basal callus small and not touching eye margins
Abdomen orange
Abdomen gray
Silvius gigantulus (Loew)
Tabanus (11 PNW spp., 8 common; see key to Tabanus species)
Atylotus (4 PNW spp., 1 common: A. insuetus Osten Sacken)
Wing veins with spots near wing margin
Wing veins without spots near wing margin
Silvius quadrivittatus (Say)
Silvius notatus (Bigot)

Figure 1. Pictorial key to common genera occurring in the Pacific Northwest (based on adult females).

from British Columbia; and *Haematopota americana* Osten Sacken from Oregon. Finally, it is equally difficult to explain the very restricted and perhaps relict population of *H. astuta* (Osten Sacken). Reported from one Oregon locality (Mahmoud, 1981), it has not been collected in any other PNW area.

Several primarily northern and eastern species have been recorded from northern Idaho, northern Washington and British Columbia. They are usually en-

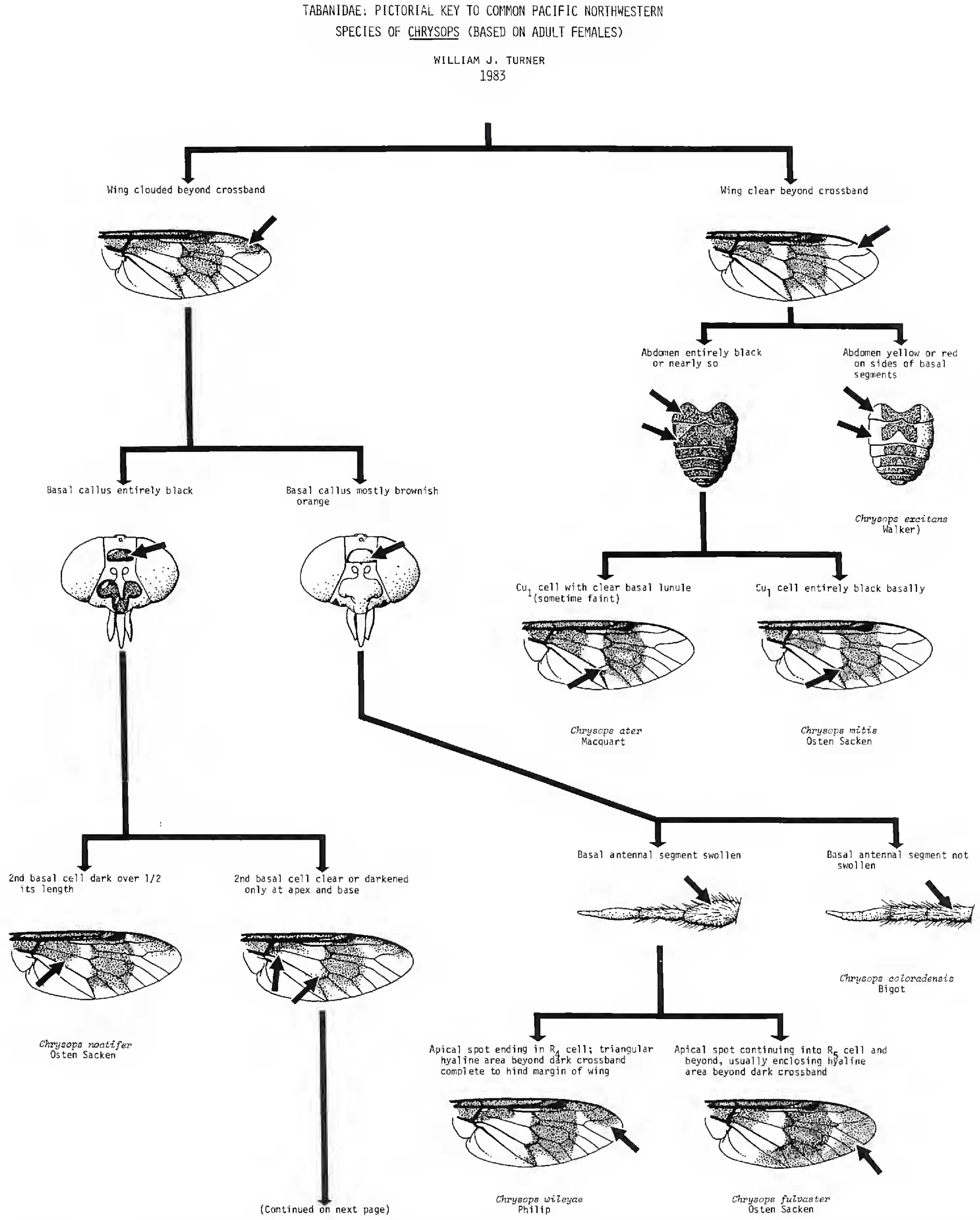
TABANIDAE: PICTORIAL KEY TO COMMON PACIFIC NORTHWESTERN
SPECIES OF CHRYSOPS (BASED ON ADULT FEMALES)
WILLIAM J. TURNER
1983
Wing clouded beyond crossband
Wing clear beyond crossband
Abdomen entirely black or nearly so
Abdomen yellow or red on sides of basal segments
Chrysops excitans Walker)
Basal callus entirely black
Basal callus mostly brownish orange
Cu1 cell with clear basal lunule (sometime faint)
Cu1 cell entirely black basally
Chrysops ater Macquart
Chrysops mitis Osten Sacken
Basal antennal segment swollen
Basal antennal segment not swollen
Chrysops coloradensis Bigot
2nd basal cell dark over 1/2 its length
2nd basal cell clear or darkened only at apex and base
Chrysops noctifer Osten Sacken
Apical spot ending in R4 cell; triangular hyaline area beyond dark crossband complete to hind margin of wing
Apical spot continuing into R5 cell and beyond, usually enclosing hyaline area beyond dark crossband
Chrysops wileyae Philip
Chrysops fulvaster Osten Sacken
(Continued on next page)

Figure 2. Pictorial key to common Pacific Northwest species of *Chrysops* (based on adult females).

countered at higher latitudes in the west. One-half (5 of 10) of the species reported here as new state records for Washington show this northeastern influence in the region. These include: *Hybomitra affinis* (Kirby), *H. lasiopthalma* (Macquart), *H. nuda* (McDunnough), *H. trepida* (McDunnough) and *Tabanus marginalis.* Other new Washington records for *Chrysops bishoppi* and *Tabanus monoensis* Hine represent species that are widely distributed but only recently collected in the state. The remaining two species new to Washington (*Hybomitra zygota* (Philip) and *Tabanus tetropsis*) have been collected in adjacent areas and represent antic-

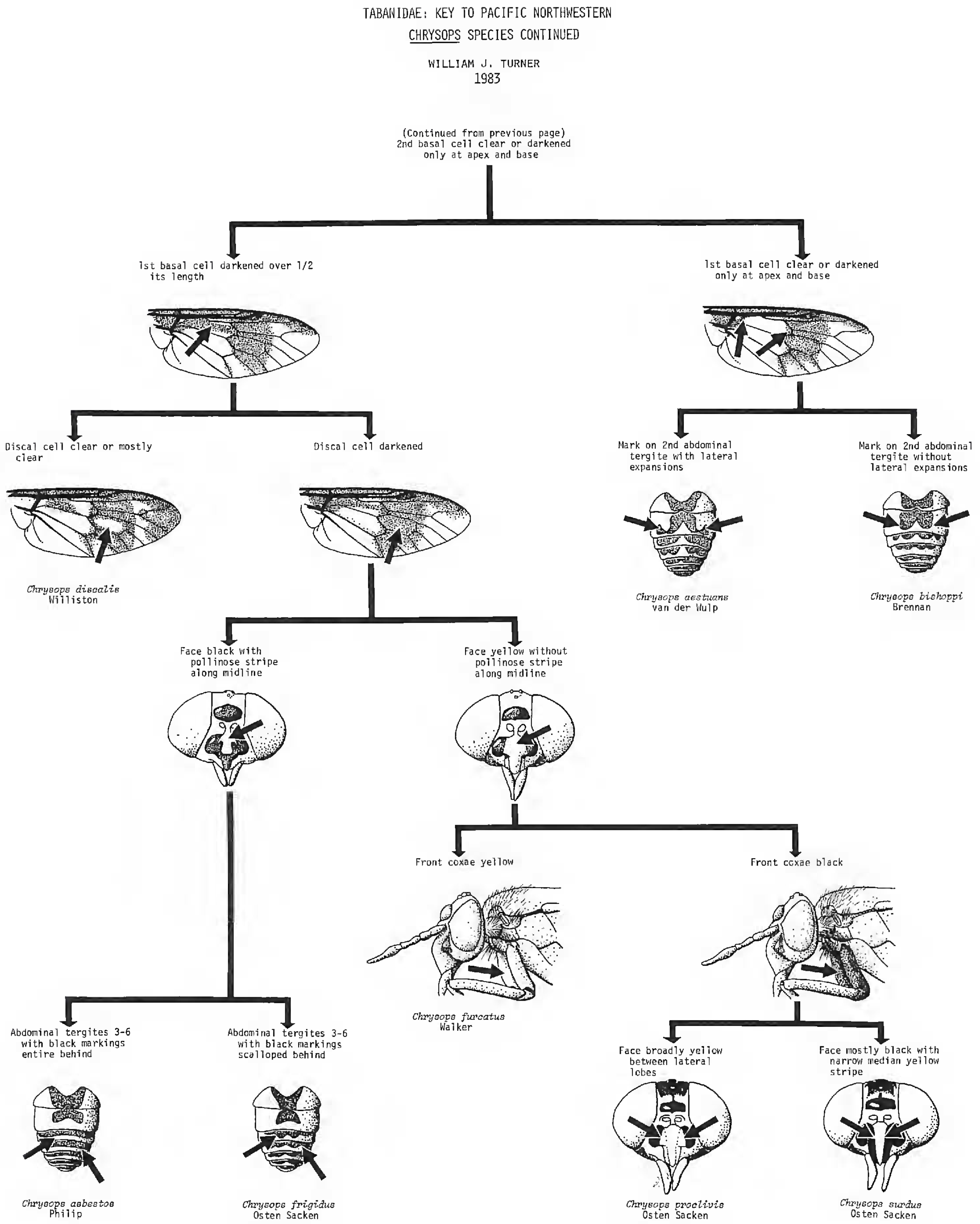
TABANIDAE: KEY TO PACIFIC NORTHWESTERN
CHRYSOPS SPECIES CONTINUED
WILLIAM J. TURNER
1983
(Continued from previous page)
2nd basal cell clear or darkened only at apex and base
1st basal cell darkened over 1/2 its length
1st basal cell clear or darkened only at apex and base
Discal cell clear or mostly clear
Discal cell darkened
Mark on 2nd abdominal tergite with lateral expansions
Mark on 2nd abdominal tergite without lateral expansions
Chrysops discalis Williston
Chrysops aestuans van der Wulp
Chrysops bishoppi Brennan
Face black with pollinose stripe along midline
Face yellow without pollinose stripe along midline
Front coxae yellow
Front coxae black
Chrysops furcatus Walker
Abdominal tergites 3-6 with black markings entire behind
Abdominal tergites 3-6 with black markings scalloped behind
Face broadly yellow between lateral lobes
Face mostly black with narrow median yellow stripe
Chrysops asbestos Philip
Chrysops frigidus Osten Sacken
Chrysops proclivis Osten Sacken
Chrysops surdus Osten Sacken

Figure 3. Key to Pacific Northwest *Chrysops* species continued.

ipated range extensions into Washington. The two new Idaho records are for *Apatolestes willistoni* Brennan and *Hybomitra zonalis.* The last is another northern species that eventually should be collected in northeastern Washington.

Pictorial Keys

Among important blood-sucking Diptera, the horse and deer flies represent one group that is easily recognized by the non-specialist. Unfortunately, the body of literature available for identifying tabanids is written primarily for the taxonomic

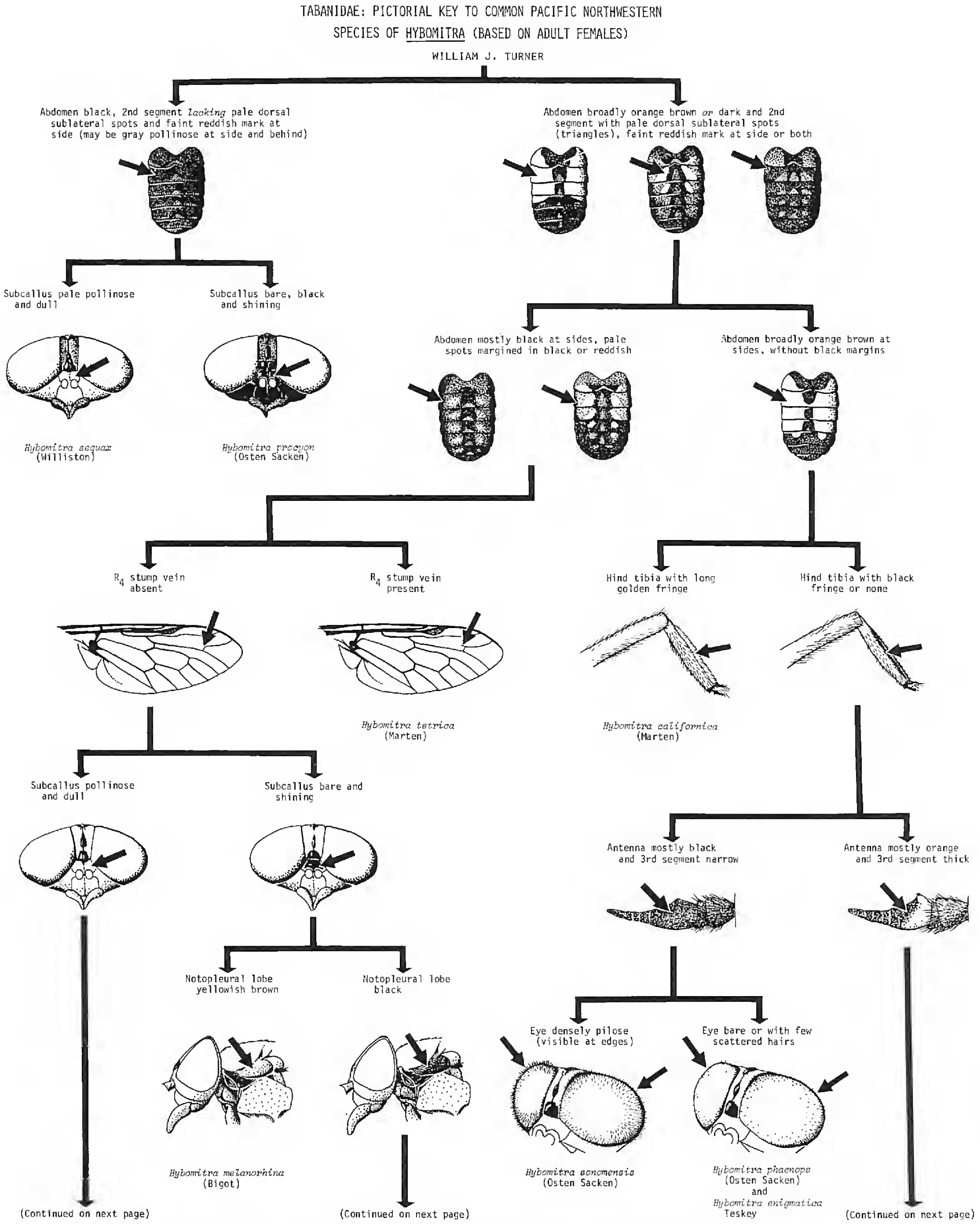
TABANIDAE: PICTORIAL KEY TO COMMON PACIFIC NORTHWESTERN
SPECIES OF HYBOMITRA (BASED ON ADULT FEMALES)
WILLIAM J. TURNER
Abdomen black, 2nd segment lacking pale dorsal sublateral spots and faint reddish mark at side (may be gray pollinose at side and behind)
Abdomen broadly orange brown or dark and 2nd segment with pale dorsal sublateral spots (triangles), faint reddish mark at side or both
Subcallus pale pollinose and dull
Subcallus bare, black and shining
Hybomitra aequax (Williston)
Hybomitra procyon (Osten Sacken)
Abdomen mostly black at sides, pale spots margined in black or reddish
Abdomen broadly orange brown at sides, without black margins
R4 stump vein absent
R4 stump vein present
Hybomitra tetrica (Marten)
Hind tibia with long golden fringe
Hind tibia with black fringe or none
Hybomitra californica (Marten)
Subcallus pollinose and dull
Subcallus bare and shining
Antenna mostly black and 3rd segment narrow
Antenna mostly orange and 3rd segment thick
Notopleural lobe yellowish brown
Notopleural lobe black
Eye densely pilose (visible at edges)
Eye bare or with few scattered hairs
Hybomitra melanorhina (Bigot)
Hybomitra sonomensis (Osten Sacken)
Hybomitra phaenops (Osten Sacken) and Hybomitra enigmatica Teskey
(Continued on next page)
(Continued on next page)
(Continued on next page)

Figure 4. Pictorial key to common Pacific Northwest species of *Hybomitra* (based on adult females).

specialist. The keys provided here represent one attempt to develop taxonomic works for more general use on this important group of biting flies. In format the keys are modeled after the CDC series of keys to arthropods and other animals of medical importance (U.S. Dept. Health, Educ., Welfare, 1967). These keys are easier to use than more traditional ones which are often limited to word descriptions and a plethora of technical terms. In all cases where precise identifications are necessary, determinations should be considered tentative until checked by a specialist.

The included keys have been limited to include the more common species and

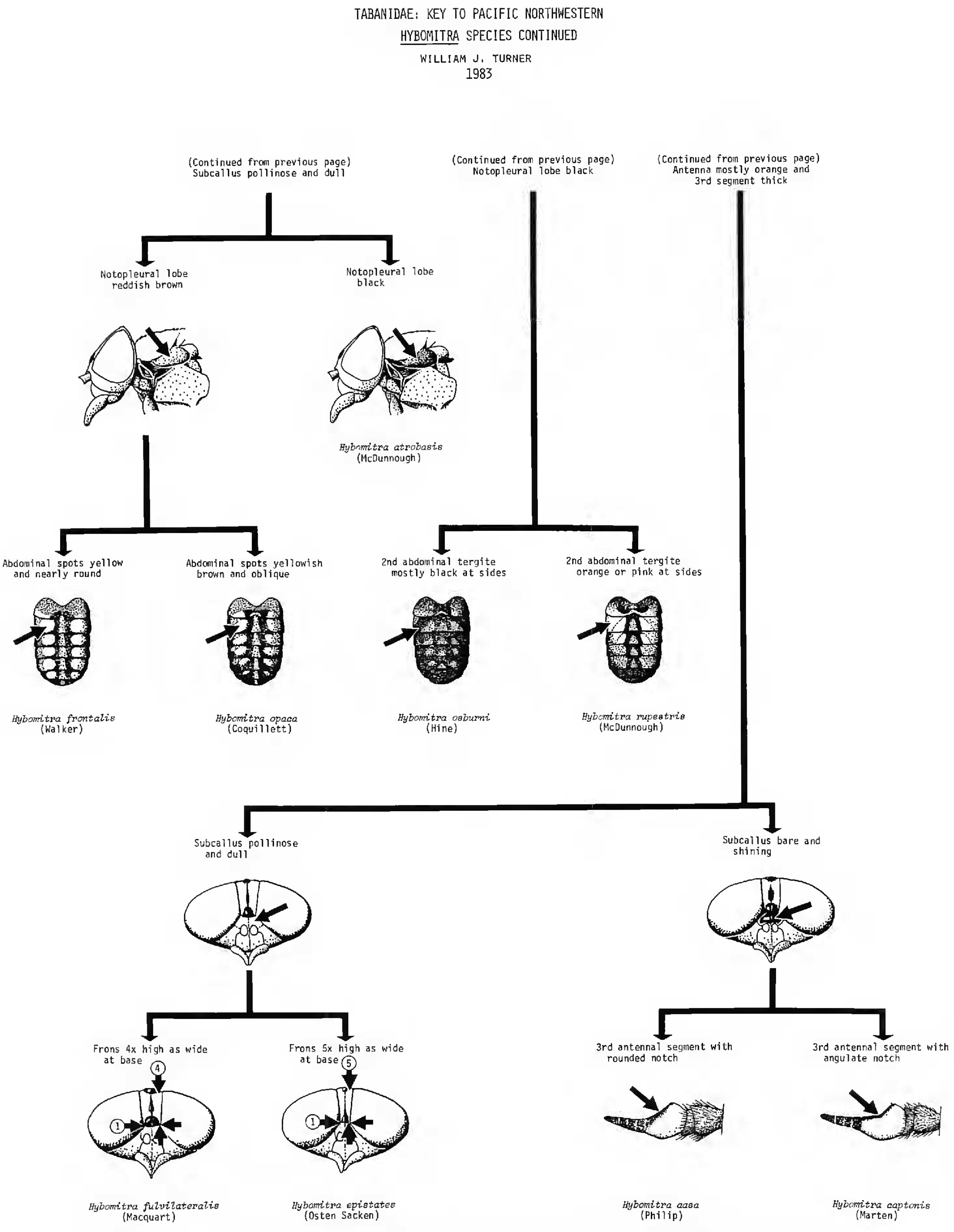
TABANIDAE: KEY TO PACIFIC NORTHWESTERN
HYBOMITRA SPECIES CONTINUED
WILLIAM J. TURNER
1983
(Continued from previous page) Subcallus pollinose and dull
(Continued from previous page) Notopleural lobe black
(Continued from previous page) Antenna mostly orange and 3rd segment thick
Notopleural lobe reddish brown
Notopleural lobe black
Hybomitra atrobasis (McDunnough)
Abdominal spots yellow and nearly round
Abdominal spots yellowish brown and oblique
2nd abdominal tergite mostly black at sides
2nd abdominal tergite orange or pink at sides
Hybomitra frontalis (Walker)
Hybomitra opaca (Coquillett)
Hybomitra osburni (Hine)
Hybomitra rupestris (McDunnough)
Subcallus pollinose and dull
Subcallus bare and shining
Frons 4x high as wide at base
4
1
Frons 5x high as wide at base
5
1
3rd antennal segment with rounded notch
3rd antennal segment with angulate notch
Hybomitra fulvilateralis (Macquart)
Hybomitra epistates (Osten Sacken)
Hybomitra aasa (Philip)
Hybomitra captonis (Marten)

Figure 5. Pictorial key to common Pacific Northwest *Hybomitra* species continued.

genera of tabanids. Whole groups were excluded because they are considered uncommon (i.e., those that are rarely encountered or poorly collected; for example, species of *Stonemyia* and *Pilimas*). Species were judged to be "common" after reviewing published and unpublished distribution records, past requests for determinations or biological information, and lists of data collected from museum specimens or associated with field survey samples and studies from the region. In some keys, however, several less common biting species have been included because either the groups were small (e.g., *Silvius*) or the similar-appearing rarer species might be confused with strictly common ones (e.g., some species of *Chry-*

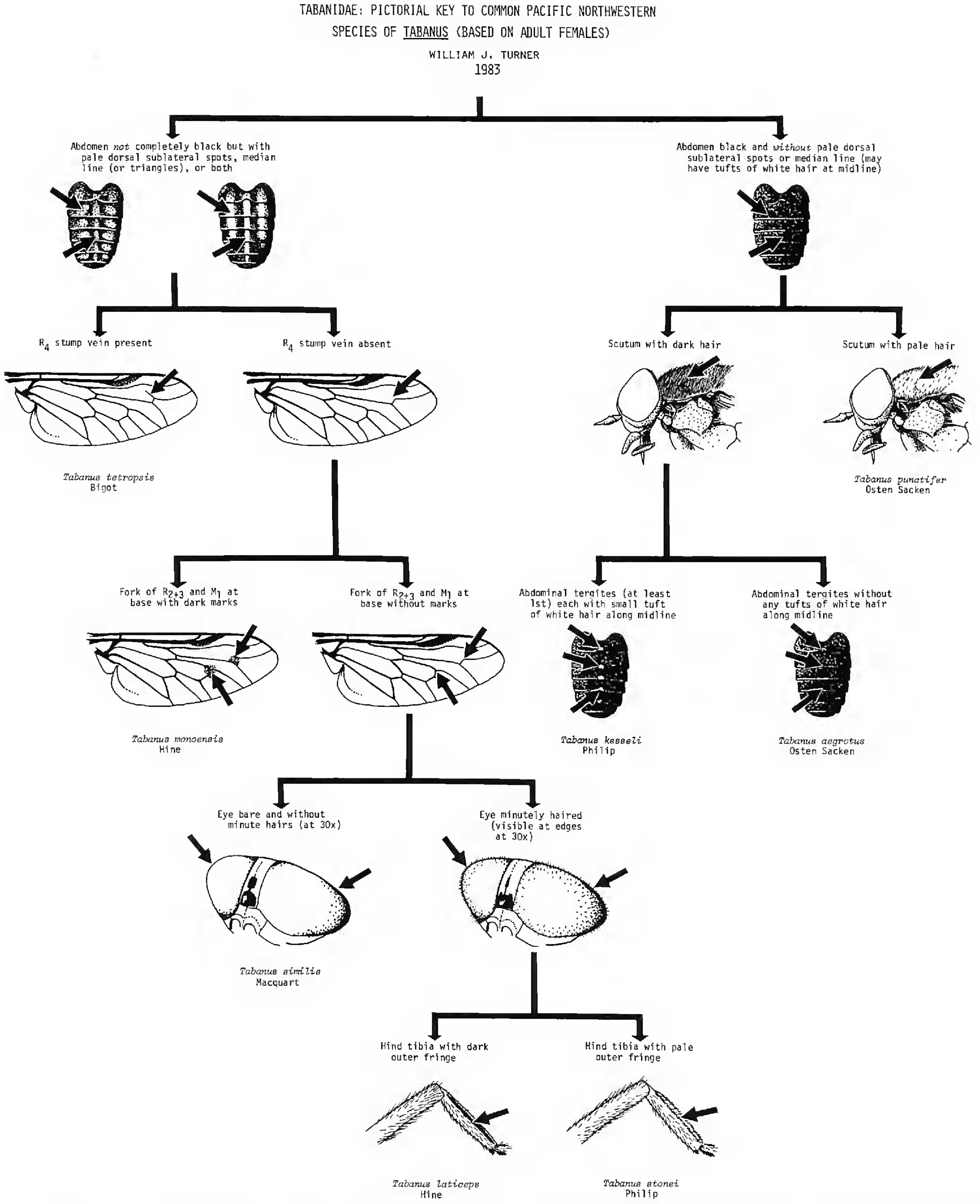
TABANIDAE: PICTORIAL KEY TO COMMON PACIFIC NORTHWESTERN
SPECIES OF TABANUS (BASED ON ADULT FEMALES)
WILLIAM J. TURNER
1983
Abdomen not completely black but with pale dorsal sublateral spots, median line (or triangles), or both
Abdomen black and without pale dorsal sublateral spots or median line (may have tufts of white hair at midline)
R4 stump vein present
R4 stump vein absent
Scutum with dark hair
Scutum with pale hair
Tabanus tetropsis Bigot
Tabanus punctifer Osten Sacken
Fork of R2+3 and M1 at base with dark marks
Fork of R2+3 and M1 at base without marks
Abdominal tergites (at least 1st) each with small tuft of white hair along midline
Abdominal tergites without any tufts of white hair along midline
Tabanus monoensis Hine
Tabanus kesseli Philip
Tabanus aegrotus Osten Sacken
Eye bare and without minute hairs (at 30x)
Eye minutely haired (visible at edges at 30x)
Tabanus similis Macquart
Hind tibia with dark outer fringe
Hind tibia with pale outer fringe
Tabanus laticeps Hine
Tabanus stonei Philip

Figure 6. Pictorial key to common Pacific Northwest species of *Tabanus* (based on adult females).

sops; also *Hybomitra*). The keys also are restricted to females as most records and identification requests involve females that are regularly attracted to humans, animals or baited traps. Males of all species, in contrast, do not seek animal hosts or suck blood and are therefore rarely encountered.

In one couplet of the key to the species of *Hybomitra,* I have not separated two species, *H. phaenops* (Osten Sacken) and *H. enigmatica* Teskey. Both are common, very similar and not readily identified without rehydrating the heads in order to restore the prominent eye bands visible in living material (see Price and Goodwin, 1979 for technical details of the method). In *H. phaenops* the dark horizontal bands are wider and extend completely to the lateral eye margin while the upper and lower margins are darkened. In contrast, the bands in *H. enigmatica* are thinner and do not reach the eye margin while the darker margins above and below are absent. Specimens keyed to *H. phaenops/enigmatica* should be referred to a specialist for positive identification.

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